

Bay Area Air Quality Management District

**939 Ellis Street
San Francisco, CA 94109**

**Proposed Amendments to
BAAQMD Regulation 8, Rule 5:
Storage of Organic Liquids**

Draft Staff Report

October 2002

Prepared by:

**Julian Elliot
Senior Air Quality Engineer**

Reviewed by:

**Steven A. Hill
Engineering Manager, Permit Evaluation Section**

**William R. deBoisblanc
Director of Permit Services**

EXECUTIVE SUMMARY	3
BACKGROUND.....	3
PROPOSED RULE AMENDMENTS	4
EMISSIONS AND EMISSIONS REDUCTIONS.....	9
ECONOMIC IMPACTS	16
ENVIRONMENTAL IMPACTS.....	17
REGULATORY IMPACTS.....	17
RULE DEVELOPMENT HISTORY	17
CONCLUSION.....	18

Executive Summary

The proposed amendments to Regulation 8, Rule 5 include:

- Re-formatting the rule and making various editorial changes to improve clarity. The most significant proposed formatting change is the consolidation of existing Sections 8-5-301 through 8-5-305, which establish the general design and emission control requirements according to tank size and material vapor pressure, into a tabular format in proposed Section 8-5-301.
- Incorporation of changes recommended by U.S. EPA in the technical support document (TSD) dated 7/9/01. The TSD was issued in conjunction with the partial disapproval of the District State Implementation Plan (SIP) by U.S. EPA on 11/9/01. With regard to this rule, EPA's partial disapproval was based on concerns that two limited exemptions in the rule were vaguely written, such that the exemptions could be applied under more circumstances than appropriate. The proposed changes have been reviewed by U.S. EPA staff and found to adequately address these concerns.
- Implementation of Control Measure SS-12 from the District's 2001 Ozone Attainment Plan. This control measure calls for better tank seals or upgrades when seals are replaced and enhanced inspection of seals and fittings.

Additional changes to Regulation 8, Rule 5, for future implementation, may be proposed in Further Study Measure FS-10 ("Organic Liquid Storage Tanks"). FS-10 is described in the 2001 BAAQMD Ozone Attainment Plan.

Background

Regulation 8, Rule 5 limits organic emissions from liquid storage tanks. The rule affects mostly petroleum refineries, chemical plants and bulk gasoline terminal distribution facilities. Some other industries that store significant amount of organic liquids are also subject to the rule. The rule was originally adopted in 1978 and has been amended a number of times, most recently on December 15, 1999. The primary reasons for the proposed modification of the rule are to address concerns expressed by U.S. EPA that the rule, specifically Sections 8-5-111 and 8-5-112, does not conform to EPA guidance, and also to implement Control Measure SS-12 from the District's 2001 Ozone Attainment Plan. In addition, various improvements to the rule are proposed.

Proposed Rule Amendments

The District has committed to make various improvements to this rule, which may be grouped into 3 categories:

1. Editorial changes. Various editorial changes are proposed which will make the rule clearer and easier to use. These changes include re-formatting sections of the rule which establish the basic control requirements, based on tank size and the vapor pressure of the tank contents, into a tabular format. This will consolidate the basic control requirements into a single section of the rule. Other editorial changes include deletion or replacement of ambiguous or potentially misleading terms. Also, existing sections of the rule are proposed to be re-located to different locations within the rule to provide a more logical rule structure.
2. Incorporation of changes recommended by U.S. EPA in the technical support document (TSD) dated 7/9/01. The TSD was issued in conjunction with the partial disapproval of the District State Implementation Plan (SIP) by U.S. EPA on October 10, 2001 (66 Fed. Reg. 51568). With regard to this rule, EPA's partial disapproval was based on concerns that two limited exemptions in the rule were vaguely written, such that the rule:

"...exempts sources from control requirements during certain startup, shutdown, and maintenance conditions in violation of EPA's 1999 guidance on excess emission during malfunctions, startup, and shutdown." [from U.S. EPA final SIP action]

The TSD suggests the following amendments to the rule:

- *Revise Rule 8-5 to clearly define "tank cleaning," "stock change," "temporary removal from service," and the other conditions addressed 8-5-111. We are concerned, for example, that "tank cleaning" could be inappropriately interpreted to cover all tank exterior cleaning. We are also concerned because the structure of the first paragraph of 8-5-111 seems to imply that tank cleaning, etc., does not require temporary removal from service. Depending on the definition of temporary removal from service, this might also suggest that an exemption from the vapor recovery requirements is not always necessary.*
- *Revise Rule 8-5 to clearly define "roof repair," "primary seal inspection," and other conditions addressed by 8-5-112.*

The proposed changes have been reviewed by U.S. EPA staff and found to adequately address their concerns.

3. Implementation of Control Measure SS-12 from the District's 2001 Ozone Attainment Plan. This control measure calls for:

"...better seals or upgrades upon replacement and more frequent inspections of seals and fittings".
[from BAAQMD SS-12]

The model for the proposed changes is the existing South Coast Air Quality Management District (SCAQMD) Rule 463 (as amended 3/11/94).

Summary Table of Proposed Amendments

(Changes in **bold type** are non-editorial changes)

Section (refers to proposed section #)	Change
8-5-110.1, 8-5-110.2	Delete "stationary" from both exemptions. This word is misleading because it implies that these exemptions apply to "stationary", but not to "portable" tanks. The definition of "storage tank" is also revised in Section 8-5-202 to clarify which "portable" tanks are not subject to this rule. This is an editorial change.
8-5-111	Clarify situations where this limited exemption applies when tanks are being removed from service (permanently or temporarily). New definitions in Sections 8-5-217, 218, 219, 220 are also added.
8-5-111.1	Enhance notification requirements when limited exemption is used to provide District information necessary to verify that exemption is being used appropriately, and to allow the District the opportunity to observe the work.
8-5-111.1.2	Change the second notification option from "prior approval" to "prior telephone notification". Since compliance is based on how the work is actually performed, it is more important for the District to have the opportunity to observe the work, than to "approve" an operation in advance. Either written or telephone notification will allow District personnel to be dispatched to observe the work.
8-5-111.5, 8-5-201, 8-5-207	Standardize and make consistent references to "approved emission control devices" in these sections. These are editorial changes.
8-5-111.7	Revise for consistency with deletion of Section 8-5-329.
8-5-112	Clarify situations where this limited exemption applies when tanks are maintained or inspected without being removed from service.
8-5-112.1	Add notification requirements when limited exemption is used to provide District information necessary to verify that exemption is being used appropriately, and to allow the District the opportunity to observe the work.
8-5-112.5	Revise seal replacement notification for consistency with Regulation 2-1-123.4.
8-5-117,	Where organic gases are used to blanket liquid contents, clarify that the

8-5-211, 8-5-301 8-5-501.1	properties of the blanket gas are relevant to the requirements and compliance status of the tank.
8-5-202	Revise the definition of "storage tank" to clarify that "portable tanks" are not exempt, except when they are part of a mobile vehicle. This is the intent of the current rule, although it may be misinterpreted to exempt all tanks which are not permanently fixed in place. This is an editorial change.
8-5-203	Delete the definition of "submerged fill pipe" since requirements are moved to 8-5-302. This is an editorial change.
8-5-206	Revise the definition of "gas tight" to a detected organic concentration less than 100 ppm (500 ppm for pressure vacuum valves) to be consistent with the standards in Regulation 8, Rule 18 ("Equipment Leaks").
8-5-210	Revise the definition of "internal floating roof tank" to clarify that external floating roof tanks which are retrofitted with fixed roofs are treated as internal floating roof tanks, in accordance with the policy memo from BAAQMD Director and Compliance and Enforcement dated March 8, 2000. This is an editorial change.
8-5-215	Correct a typographical error (change "pasing" to "passing"). This is an editorial change.
8-5-217	Add definition of "decommissioning" to incorporate U.S. EPA guidance.
8-5-218	Add definition of "stock change" to incorporate U.S. EPA guidance.
8-5-219	Add definition of "tank cleaning" to incorporate U.S. EPA guidance.
8-5-220	Add definition of "temporary removal from service" to incorporate U.S. EPA guidance.
8-5-221	Add definition of "liquid balancing" to clarify that this operation must be accomplished without breaking vacuum or landing a floating roof on its supports.
8-5-301	Consolidate existing Sections 8-5-301, 302, 303, 304 and 305 in proposed Section 8-5-301. This is an editorial change.
8-5-302	Transfer the requirements for submerged fill pipes from existing definition 8-5-203. This is an editorial change.
8-5-303	Transfer the requirements for pressure vacuum valves from existing Sections 8-5-302, 303 and 320.3. This is an editorial change.
8-5-304.1 8-5-304.2 8-5-304.3	Transfer the requirement in existing Sections 8-5-311.1 and 8-5-320 for external floating roof tanks. This is an editorial change.
8-5-304.4, 8-5-305.5	1) Re-instate language requiring that seals be properly installed and maintained and that they be in good operating condition. This language appeared in the May 4, 1988 version of the rule and should not have been deleted. This is an editorial change. 2) Add a prohibition on the presence of liquid product above either primary or secondary seals. The presence of liquid is an indication of seal failure or improper tank operation.
8-5-305.1, 8-5-305.2,	1) Transfer the requirements from existing Section 8-5-311.2.1 and 311.2.2 for "older" internal floating roof tanks to proposed Sections 8-5-305.1.1 and

8-5-305.4, 8-5-322.5	<p>305.1.3. This is an editorial change.</p> <p>2). Add explicit option of a metallic shoe primary seal to Section 305.1.2 and 305.2. This is an editorial change since it is only a change in nomenclature – instead of including metallic shoe seals as a type of liquid-mounted seal, which is not a consistent categorization among air districts, metallic shoe seals will be recognized as a unique class of seal.</p> <p>3) Transfer the requirements from existing Section 8-5-311.2.3 for "newer" internal floating roof tanks to proposed Section 8-5-305.2. This is an editorial change.</p> <p>4) Transfer the requirement in existing Sections 8-5-320 for internal floating roof tank fittings to proposed Section 8-5-305.4. This is an editorial change.</p> <p>5) Add seal replacement criteria to establish when a repaired seal is considered new and subject to most stringent sealing standards to Section 305.2. This is a necessary clarification to proposed Section 8-5-305.1 (transferred from existing Section 8-5-311.2.3) and Section 8-5-322.5, since these sections may be interpreted to allow multiple partial seal replacements which completely replace a seal over time, without triggering the requirements for new seals. The proposed criteria is the same criteria which is currently used by the BAAQMD Permit Services Division to determine when a permit is required for a partial seal replacement.</p>
8-5-305.3	Transfer the requirement in existing Section 8-5-330 for internal floating roof tanks. This is an editorial change. Also, revise this requirement (viewing ports on internal floating roof tank fixed roofs) for external floating roof tanks retrofitted with fixed roofs, as long as adequate visibility is provided, in accordance with the policy memo from BAAQMD Director and Compliance and Enforcement dated March 8, 2000. This is an editorial change.
8-5-306	Transfer the requirement in existing Section 8-5-311.3 for emission control systems. This is an editorial change.
8-5-307	Transfer the requirement in existing Section 8-5-305 for pressure tanks. This is an editorial change.
8-5-320.1	Transfer the secondary seal requirement in existing Section 8-5-320.1 to proposed Section 322.6. This is an editorial change.
8-5-320.2, 8-5-320.3, 8-5-320.5	Reformat and clarify the wording of these sections. These are editorial changes.
8-5-321.2	Add the option for a metallic shoe seal. The language of Section 321.3 indicates that this was previously intended to be an acceptable option. Therefore, this is an editorial change.
8-5-322.3	Delete "welded" in 8-5-322.3 since the same secondary seal standard also applies to riveted tanks in 8-5-322.4. This is an editorial change.
8-5-322.4	Delete the requirement in 8-5-322.4 which duplicates the requirement of 8-5-322.3. This is an editorial change.
8-5-322.6	Transfer the prohibition from mounting a secondary seal on the primary seal from existing Section 8-5-320.1. This is an editorial change.

8-5-328.1	Consolidate existing requirements 8-5-328.1 and 328.2 in proposed Section 8-5-328.1; this is an editorial change.
8-5-328.2	Consolidate existing requirement 8-5-329 in proposed Section 8-5-328.2. This is an editorial change.
8-5-401.1	<p>1) Currently, primary and secondary seals on external floating roof tanks are subject to inspection every 1, 5 or 10 years, as specified in existing Sections 8-5-401.1, 401.3, 402.2 and 402.3. Proposed Section 8-5-401 would require all external floating roof tank seals to have seal inspections twice per year (conformity with South Coast rule).</p> <p>2) Add a requirement that flexible wiper seals be inspected when they are in the "up" position (which occurs when the last tank roof movement was downward); the full surface of a wiper seal is visible only when it is in this position.</p>
8-5-401.2	Currently, external floating roof tanks are subject to fitting inspection every 1 or 10 years, as specified in existing Sections 8-5-402.1 and 402.3. Proposed Section 8-5-401.2 would require all external floating roof tanks to have fitting inspections twice per year (conformity with South Coast rule).
8-5-402.1	<p>1) Transfer existing requirement for full inspections of primary and secondary seals on internal floating roof tanks from existing Sections 8-5-401.2 and 402.2 to proposed Section 8-5-402.1. This is an editorial change.</p> <p>2) Revise this section to require full inspections of primary and secondary seals whenever the tank seals become accessible because a seal repair or replacement is performed.</p> <p>3) Add a requirement that flexible wiper seals be inspected when they are in the "up" position (which occurs when the last tank roof movement was downward); the full surface of a wiper seal is visible only when it is in this position.</p>
8-5-402.2	<p>Currently, primary and secondary seals on internal floating roof tanks are subject to visual inspection every year, as specified in existing Section 8-5-403. Proposed Section 8-5-402.2 would increase the frequency of secondary seal visual inspections to twice per year, while Section 8-5-403 is deleted (conformity with South Coast rule).</p> <p>2) Add a requirement that flexible wiper seals be inspected when they are in the "up" position (which occurs when the last tank roof movement was downward); the full surface of a wiper seal is visible only when it is in this position.</p>
8-5-402.3	Currently, internal floating roof tanks are subject to fitting inspection every 10 years, as specified in existing Section 8-5-402.2. Proposed Section 8-5-402.3 would increase the frequency of fitting inspections to twice per year (conformity with South Coast rule).
8-5-403	Add inspection requirement (semi-annual) for pressure vacuum valves (conformity with South Coast rule).
8-5-404	Revise certification requirements to reflect proposed seal and fitting inspection requirements and frequencies.

8-5-501.1	Add record retention requirement for material storage records. This is a necessary addition since this section currently requires records, but specifies no retention period. 24 months is the standard retention requirement for District rules.
8-5-501.2	Require records of seal replacements to allow monitoring of compliance with 8-5-305.2 and 8-5-322.5. This requirement is necessary to allow implementation of proposed Section 8-5-305.1 and 322.5. The retention requirement has been set at 10 years because seal replacements are usually infrequent and an extended retention requirement is necessary to record multiple partial seal replacements over an extended period of time.
8-5-502	Reword this section to require that an "approved emission control system" used during tank degassing be tested to verify acceptable performance prior to use, on an annual basis. The existing section already requires an annual source test, but does not specify that a test must be performed prior to use.
8-5-503	Specify which organic concentration standards in the proposed rule require use of an approved detector. This is an editorial change.
8-5-603.1, 8-5-603.2, 8-5-605	Revise citations to reflect proposed rule structure. These are editorial changes.

Emissions and Emissions Reductions

Introduction

The emission reduction estimate for this measure is a substantial revision of the estimate made for the Bay Area 2001 Ozone Attainment Plan. The proposed amendments are expected to achieve an emission reduction of 0.13 tons per day of volatile organic compounds. This emission reduction would come from increases in inspection frequency for tanks and fittings. The emission reduction estimate included in the 2001 Plan was 1.9 tons per day. Most of this emission reduction was expected to come from installation of “zero gap” secondary seals on the remaining external floating roof tanks without such seals. However, the rule already requires installation of zero gap seals over time as old seals are replaced, and the earlier analysis failed to recognize that offsetting emission increases would result from taking these tanks out of service sooner, cleaning them, and installing new zero gap seals. It should be noted that the District’s zero gap requirements are much more stringent than tank requirements in any other air district in California.

Because of the difficulty in forecasting emission reductions in a plan when adequate data is usually available only during later rule development, the 2001 Plan made no specific commitment to the estimates for individual measures and instead committed to an aggregate emission reduction of 8.2 tons per day from the seven stationary source control measures in the Plan. The table below sets forth the original Plan estimates for individual measures and the current estimates, including the estimate for these amendments.

Emission Reduction Estimates for 2001 Plan
Stationary Source Control Measures
(Reductions in tons/day of volatile organic compounds)

Measure	Plan Estimate	Current Estimate
SS-11 Architectural Coating (adopted 11/01)	2.9	3.75 as adopted
SS-12 Storage Tanks	1.9	0.13
SS-13 Surface Prep Standards	0.3	2.1 as adopted
SS-14 Aqueous Cold Cleaning	3.0	2.2 as adopted
SS-15 Flare Monitoring	TBD	TBD
SS-16 Refinery Valves	TBD	TBD
SS-17 Vessel Depressurization	0.1	0.1
Total Estimated Reductions	8.2	8.3

Though these amendments to Regulation 8, Rule 5 fall short of the emission reduction expected when control measure SS-12 was included in the 2001 Plan, other measures will produce greater reductions than expected, and the District will still meet the Plan's emission reduction commitment. Nevertheless, further emission reduction possibilities, including expediting installation of zero gap secondary seals, will be explored in connection with the Plan's further study measure for storage tanks, FS-9.

Emission Reductions from Proposed Amendments

Specific proposed changes which may result in emission reductions are discussed here. Though many of the proposed amendments have the potential to reduce emissions by closing potential loopholes or by clarifying requirements, many of these emission reductions cannot be quantified.

Unquantifiable Emission Reductions

Proposed Sections 8-5-111, 112, 217, 218, 219 and 220. The proposed clarifications are intended to ensure that exemptions from abatement requirements are not applied except when necessary and appropriate. Although these clarifications may prevent future emissions that might otherwise occur, the District has no specific knowledge of inappropriate application of the exemptions, and therefore no basis for quantification of an emission reduction.

Proposed Sections 8-5-117, 211, 301, 501.1. Currently, tank requirements are based on the tank size, in-service date, and the properties of the liquid contained in the tank. However, in some cases, tanks are "blanketed" with an organic gas (natural gas, refinery fuel gas). Where blanket gases are used, it is appropriate to consider these gases as a potential source of emissions. The proposed changes would require that blanket gas properties be considered when determining the applicable tank requirements and would require that blanket gas records be kept. These amendments are likely to lead to controls

for certain tanks and to corresponding emission reductions. These emission reductions cannot be quantified.

Proposed Section 8-5-206. The "gas tight" criteria for pressure-vacuum valves and emission control systems would be reduced from 10,000 ppm to 100 ppm (500 ppm for pressure vacuum valves) for consistency with Regulation 8, Rule 18 ("Equipment Leaks"). This change is likely to result in emission reductions. However, these reductions have not been quantified, partly because of the inherent difficulty in accurately quantifying emissions from fugitive emission sources such as leaking valves and connectors.

Proposed Section 8-5-221. A definition is added for "liquid balancing" which clarifies that this operation must be completed without breaking vacuum or landing a floating roof on its supports to prevent evaporation of organic liquids. Because emissions can result through the creation of vapor space below the tank roof when the tank breaks vacuum or when the tank roof lands on its supports. Although this clarification may prevent future emissions that might otherwise occur, and closes a loophole in the current rule, the District has no specific knowledge of inappropriate liquid balancing operations and therefore no basis for quantification of an emission reduction.

Proposed Sections 8-5-304.4 and 305.5. A prohibition is added on the presence of liquid product on tank seals or on top of the tank roof. The presence of liquid would indicate some mechanical or operational failure (e.g. liquid "belching" through tank seals, seal failure, an uneven or cracked roof, broken roof fitting), and would result in increased emissions. This prohibition closes a loophole in the current rule and may result in seal repairs or replacements which would not otherwise be required. However, there is not an adequate basis for quantification of an emission reduction.

Proposed Sections 8-5-305.1, 305.2, 305.4 and 322.5. These sections of the rule provide less strict sealing standards for seals which were installed prior to a specific date. However, seals are sometimes repaired by replacing sections of the seal. Over time, an entire seal may be replaced in sections without triggering the sealing standards applicable to new seals. Therefore, a criteria is added to these sections to require that a seal be treated as a new seal, subject to the latest seal standards, when a certain fraction of the seal is replaced at once or when a certain fraction of the seal is replaced over a period of time. The specific criteria which is used is the same criteria which the Permit Services Division currently uses to determine when seal repairs trigger the requirement for a permit application. Although this new criteria may require that seals be replaced with better-fitting seals than would otherwise be the case, there is not an adequate basis for quantification of an emission reduction.

Proposed Section 8-5-401.2. Currently, external floating roof tanks are subject to fitting inspection every 1 or 10 years, as specified in existing Sections 8-5-402.1 and 402.3. Proposed Section 8-5-401.2 would require all external floating roof tanks to have fitting inspections twice per year, in accordance with South Coast Rule 463. Although more

frequent inspections may result in emission reductions, there is not an adequate basis for quantification of an emission reduction.

Proposed Section 8-5-402.1. The basic inspection frequency requirement for internal floating roof tanks is not increased. Internal floating roof tanks are inspected less frequently than external floating roof tanks because the vapor space above the tank is considered a potentially dangerous "confined space" which may not be accessible for extended periods. The proposed section would require that inspections are performed whenever the vapor space becomes accessible because a seal repair or replacement is performed. Also, inspections of flexible wiper seals, which curve upward against the tank wall when the tank roof drops, and flip to curve downwards when the roof rises, are required by the proposed section to be performed when the seal is curved upward and is most visible for inspection. Although these proposals may result in more frequent or more complete inspections, which may result in emission reductions, there is not an adequate basis for quantification of an emission reduction.

Proposed Section 8-5-402.2. Currently, secondary seals on internal floating roof tanks are subject to visual inspection every year, as specified in existing Section 403. Proposed Section 8-5-402.2 would increase the frequency of secondary seal visual inspections to twice per year. This section is also proposed to include a requirement that wipe seals be inspected in the "up" position, as in Section 8-5-402.1. Although these proposals may result in more frequent or more complete inspections, which may result in emission reductions, there is not an adequate basis for quantification of an emission reduction.

Proposed Section 8-5-402.3. Currently, internal floating roof tanks are subject to fitting inspection every 10 years, as specified in existing Sections 8-5-402.1 and 402.2. Proposed Section 8-5-402.4 would require all external floating roof tanks to have fitting inspections twice per year, in accordance with South Coast Rule 463. Although more frequent inspections may result in emission reductions, there is not an adequate basis for quantification of an emission reduction.

Proposed Section 8-5-403. This section would add a twice-yearly inspection requirement for pressure vacuum valves on fixed roof tanks to monitor compliance with proposed Section 8-5-303, in accordance with South Coast Rule 463. The leak standard is the same as for pressure vacuum valves in other services. This is a new requirement. This change has the potential to result in emission reductions. However, these reductions have not been quantified, partly because of the inherent difficulty in accurately quantifying emissions from fugitive emission sources such as pressure-vacuum valves.

Proposed Sections 8-5-404, 8-5-501.1, 8-5-501.2. These sections contain new recordkeeping requirements associated with other proposals and no emission reduction is expected from these requirements although they are necessary to make other requirements enforceable.

Proposed Section 8-5-502. "Approved emission control systems" which are used to abate emissions from tanks are already required to be tested to verify adequate abatement efficiency on an annual basis. However, because these systems are often not permanently

located at the refinery (they may be operated by contractors), it is difficult to enforce this requirement. The proposal would retain the annual source test requirement, but would require that the system be tested prior to use. Although this proposal closes a loophole in this section and may result in emission reductions, there is not an adequate basis for quantification of an emission reduction.

Calculated Emission Reductions

Proposed Section 8-5-401.1. Currently, primary seals on external floating roof tanks are subject to inspection every 5 or 10 years pursuant to existing Section 8-5-401. Secondary seals are subject to inspection every 10 years for "zero gap seals" and annually for all other seals pursuant to existing Section 8-5-402. Proposed Section 8-5-401 would consolidate external floating roof seal inspection requirements and would require an inspection frequency of twice per year, in accordance with South Coast Rule 463.

The following table summarized all changes in inspection frequency that would result from the proposed amendments.

Proposed Changes in Inspection Frequency

Floating Roof Type	Component	Current Inspection Frequency	New Inspection Frequency	Rule Section
External	Primary seal	1x/5 yrs 1x/10 yrs for welded w/zero gap secondary	2x/year for all	Old §8-5-401.1, §8-5-401.3 New §8-5-401.1
	Secondary seal	1x/yr 1x/10yrs for welded w/zero gap secondary	2x/year for all	Old §8-5-402.1, §8-5-401.3 New §8-5-401.1
	Fittings	1x/yr 1x/10yrs for welded w/zero gap secondary	2x/year for all	Old §8-5-402.1, §8-5-401.3 New §8-5-401.2
Internal	Primary seal	1x/10 yrs	Same	Old §8-5-401.2 New §8-5-402
	Secondary seal	1x/10 yrs 1x/yr (visual only)	1x/10 yrs 2x/yr (visual only)	Old §8-5-402.2 New §8-5-402.1, §8-5-402.2
	Fittings	1x/10yrs	2x/year (visual only, complete whenever accessible up to 2x/year)	Old §8-5-402.2 New §8-5-402.3

Though all of these changes have some potential to produce emission reductions, emission reduction have been calculated only for changing the inspection interval from 10 years to twice yearly for external floating roof tanks with zero gap secondary seals. This change is the most dramatic change in inspection requirements and is the one most likely to produce significant emission reductions.

External Floating Roof Tanks with Zero Gap Seals

There are 390 external floating roof tanks in the District database. District records show that 80% of the tanks (312 tanks) are equipped with zero gap seals and thus currently subject to a 10 year inspection interval. Under the proposed amendments, these tanks would be subject to a semiannual inspection interval. These more frequent inspections would reduce noncompliance with seal gap requirements significantly.

Past District studies (BAAQMD 1992, BAAQMD 2001) taken together suggest that the noncompliance rate for external floating roof secondary seals, including zero gap seals, has historically averaged about 10%. For the 1992 study, 23 external floating roof tanks were inspected, and 4 of the tanks (17%) were found to have secondary seals that failed to comply with gap seal requirements. In the 2001 study, 44 external floating roof tanks were inspected, and 3 of the tanks (7%) were found to have excessive secondary seal gaps. Taken together, these studies suggest a noncompliance rate of 10% for all external floating roof secondary seals. Though compliance rates have dropped below 10% based on the more recent study, more of the external floating roof tanks now have zero gap seals and are thus subject to the less frequent inspection interval. A 10% noncompliance rate therefore seems to be a reasonable estimate given the current infrequency of inspection for most of these tanks.

Tank emissions are calculated using equations and emission factors from U.S. EPA's Compilation of Air Pollutant Emission Factors, AP-42, Volume I: *Stationary Point and Area Sources*. For standing storage losses from external floating roof tanks, AP-42 generally specifies the use of emission factors for "average fitting seals." However, Regulation 8, Rule 5 requires "zero gap" secondary seals that would be considered "tight fitting seals" (for which emission factors are available in AP-42 background documents). For zero gap seals in good condition, the emission factors for "tight fitting seals" are appropriate. However, where a zero gap seal fails to comply with gap requirements, the more appropriate emission factors are those for "average fitting seals", as suggested by "Estimating Excess Emissions From External Floating-Roof Tanks" (see Vergara, 1989).

Approximately 10% of external floating roof tanks equipped with zero gap seals (or 31 tanks) can presently be expected to be out of compliance with gap requirements. Given that these seals are only subject to inspection every 10 years, requiring semiannual inspections should greatly reduce this noncompliance and reduce emissions from these tanks. Since approximately 15% of external floating roof tanks are riveted, 26 tanks are assumed to be welded, while 5 are assumed to be riveted.

Following is an estimate of the emission reduction resulting from the difference in tight-fitting versus average-fitting secondary seals at 31 tanks. All equations and data are from U.S. EPA's "Emission Factor Documentation for AP-42 Section 7.1" (Final Report, September 1997), except as noted. Losses related to the tank seals on floating roofs are referred to as "rim seal losses" (L_R).

$$L_R = (K_{Ra} + K_{Rb} v^n)DP * M_V K_C \quad (\text{Equation 3-27})$$

where:

L_R = rim seal loss, lb/yr
 K_{Ra} = zero wind speed rim seal loss factor, lb-mole/ft yr
 K_{Rb} = wind speed dependent rim seal loss factor, lb-mole/(mph)ⁿft yr
 v = average ambient wind speed at tank site, mph
 n = seal-related wind speed exponent, dimensionless
 D = tank diameter, ft
 P^* = vapor pressure function, dimensionless
 M_V = average vapor molecular weight, lb/lb-mole
 K_C = product factor; $K_C = 0.4$ for crude oils; $K_C = 1$ for all other organic liquids

Most external floating roof tanks are permitted to hold a range of materials, from crude oil to high vapor pressure intermediates. Regulation 8, Rule 5 prohibits the use of floating roof tanks for materials with a vapor pressure greater than 11 psia. The 31 tanks will be assumed to contain a common intermediate product, naphtha, with a typical vapor pressure of 9 psia. Thus, the following values are used:

K_{Ra}	welded: 0.6: average seals 0.4: tight seals riveted: 1.1: average seals 0.4: tight seals	from Table 5-2 for tanks with mechanical shoe primary seals and rim mounted secondary seals; Note a recommends this as the most common configuration of external floating roof tanks; for tight fitting seals on riveted tanks, K_{Ra} values for welded tanks are used since riveted data is not available
K_{Rb}	welded: 0.4: average seals 0.4: tight seals riveted: 0.3: average seals 0.4: tight seals	from Table 5-2 for tanks with mechanical shoe primary seals and rim mounted secondary seals; Note a recommends this as the most common configuration of external floating roof tanks; for tight fitting seals on riveted tanks, K_{Rb} values for welded tanks are used since riveted data is not available
v	10 mph	average prevailing wind speed in the area where most floating tanks are located (West Contra Costa County)
n	1.5 for riveted, average-fitting seals; 1.0 for all others	from Table 5-2 for tanks with mechanical shoe primary seals and rim mounted secondary seals; Note b recommends this as the most common configuration of external floating roof tanks; for tight fitting seals on riveted tanks, n values for welded tanks are used since riveted data is not available
D	150 ft	average diameter of floating roof tanks in the BAAQMD
P^*	0.22	from Figure 3-11, based on the assumed value of M_V
M_V	80	for naphtha from Table 3-2
K_C	1.0	from page 3-10, for any organic liquid except crude oil

Then, the emission reduction is:

5 ((riveted tank emissions, average seals) - (riveted tank emissions, tight seals))

plus 26 ((welded tank emissions, average seals) - (welded tank emissions, tight seals))

or,

5 ((1.1 + (0.3)(10)^{1.5})(150)(0.22)(80)(1.0) - (0.4 + (0.4)(10)^{1.0})(150)(0.22)(80)(1.0))

$$+ \frac{26}{(0.4)(10)^{1.0}} \left((0.6 + (0.4)(10)^{1.0})(150)(0.22)(80)(1.0) - (0.4 + (0.4)(10)^{1.0})(150)(0.22)(80)(1.0)) \right)$$

$$= 95,394 \text{ lb/yr} = 48 \text{ ton/yr} = 0.13 \text{ ton/day}$$

Economic Impacts

Socioeconomic Impacts

Section 40728.5 of the California Health and Safety Code (H&SC) requires districts to assess the socioeconomic impacts of amendments to regulations that, "...will significantly affect air quality or emissions limitations." A socioeconomic analysis has been performed, and the amendments were found to result in a total annual cost of \$548, 962 to the affected facilities in the District, which is equivalent to 0.0027% of sales by those affected businesses, and expected to result in substantially less than 1% drop in profits. A copy of the analysis is attached.

Most of the costs associated with this proposed rule are the result of increased tank inspections. The economic analysis assumed that affected businesses currently perform the minimum inspections required by the rule, and calculated the cost difference associated with performing the additional inspections which are proposed. However, there is evidence that some affected facilities currently perform inspections much more frequently than required by the current regulation, and therefore will incur less additional costs than estimated by the economic analysis. Indeed, the affected facility with the largest number of floating roof tanks has indicated that it already performs some inspections more frequently even than the proposed regulation would require (see BAAQMD Docket 3401, August 2002).

Incremental Costs

Under Health and Safety Code Section 40920.6, the District is required to perform an incremental cost analysis for a proposed rule under certain circumstances. To perform this analysis, the District must (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness for each option. To determine incremental costs, the District must "calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option." Because EPA's limited disapproval of Regulation 8, Rule 5 required the District to modify the rule as proposed and because of the commitment to implement control measure SS-12 from the Bay Area 2001 Ozone Attainment Plan, the District can identify no other control options that meet the policy aims of this proposal, and no incremental cost analysis is required.

Environmental Impacts

Pursuant to the California Environmental Quality Act (Public Resources Code Section 21000 et seq.), an initial study for the proposed amendments to Regulation 8, Rule 5 was conducted by the District's CEQA consultant, Jones & Stokes. The study concluded that the proposed amendments would not have significant environmental impacts. A Negative Declaration is proposed for adoption by the Board.

Regulatory Impacts

Section 40727.2 of the Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and district air pollution control requirements for the equipment or source type affected by the proposed change in district rules. The district must then note any differences between these existing requirements and the requirements imposed by the proposed change.

Rule Development History

The 2001 BAAQMD Ozone Attainment Plan included Control Measure SS-12 to effect certain improvements to Regulation 8, Rule 5. This plan was adopted on October 24, 2001. The proposed rule implements Control Measure SS-12.

In addition, on October 10, 2001, U.S. EPA issued a partial disapproval of the BAAQMD State Implementation Plan (SIP) based on concerns that two limited exemptions in Regulation 8, Rule 5 (8-5-111, 8-5-112) were vaguely written, such that the exemptions could be applied under more circumstances than appropriate (see 66 Fed. Reg. 51568). The proposed changes, which are included in the proposed regulation, have been reviewed by U.S. EPA staff and found to adequately address these concerns.

A meeting with industry representatives was held at the BAAQMD offices on April 30, 2002 to address industry concerns regarding Control Measure SS-12 and the first draft of the proposed rule. Written comments dated May 3, 2002 were received from the Western States Petroleum Association. These comments were addressed in a subsequent draft of the proposed rule.

A public workshop was held in the Contra Costa County Administration Building in Martinez on June 27, 2002 where the proposed changes were discussed in detail. In addition to BAAQMD and CARB staff, there were approximately ten representatives from affected facilities. Written comments dated July 26, 2002 were received from the Western States Petroleum Association. Some of these comments were addressed in a subsequent draft of the proposed rule, and some comments remain to be resolved in Further Study SS-10.

Conclusion

Pursuant to Section 40727 of the California Health and Safety Code, the proposed rule must meet findings of necessity, authority, clarity, consistency, non-duplication, and reference. The proposed amendments to Regulation 8, Rule 5 are:

- Necessary to limit emissions of volatile organic compounds, a primary precursor to ground-level ozone formation, and to meet the requirements of the 1999 San Francisco Bay Area Ozone Attainment Plan;
- Authorized under Sections 40000, 40001, 40702, and 40725 through 40728 of the California Health and Safety Code;
- Written or displayed so that its meaning can be easily understood by the persons directly affected by it;
- Consistent with other District rules, and not in conflict with state or federal law;
- Non-duplicative of other statutes, rules or regulations; and
- Implementing, interpreting or making specific the provisions of the California Health and Safety Code Sections 40000 and 40702.

The proposed new rule has met all legal noticing requirements, has been discussed with the regulated community, and it reflects the input and comments of many affected and interested parties. District staff recommends adoption of proposed amendments to Regulation 8, Rule 5: Storage of Organic Liquids.